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solplan review

the independent newsletter of energy conservation, building science & construction practice

Inside . . .

We don't pay much attention to the efficiency of fan motors, yet they are very significant to total energy consumption of a building. We review just how energy efficient fans are.

Ground source heat pumps are being refined and are more readily available now. We review how heat pumps work and discuss a few design considerations that must be taken.

The Advanced Houses Program promises to offer a fascinating glimpse of how houses will be built in the near future. We present the list of first round finalists and the kind of projects being proposed.

If we are to build healthy buildings we have to keep in mind what kinds of materials used. We present some thoughts on using clean materials.

Other items include the latest from TRC, an innovative site servicing approach, new products, and much more.

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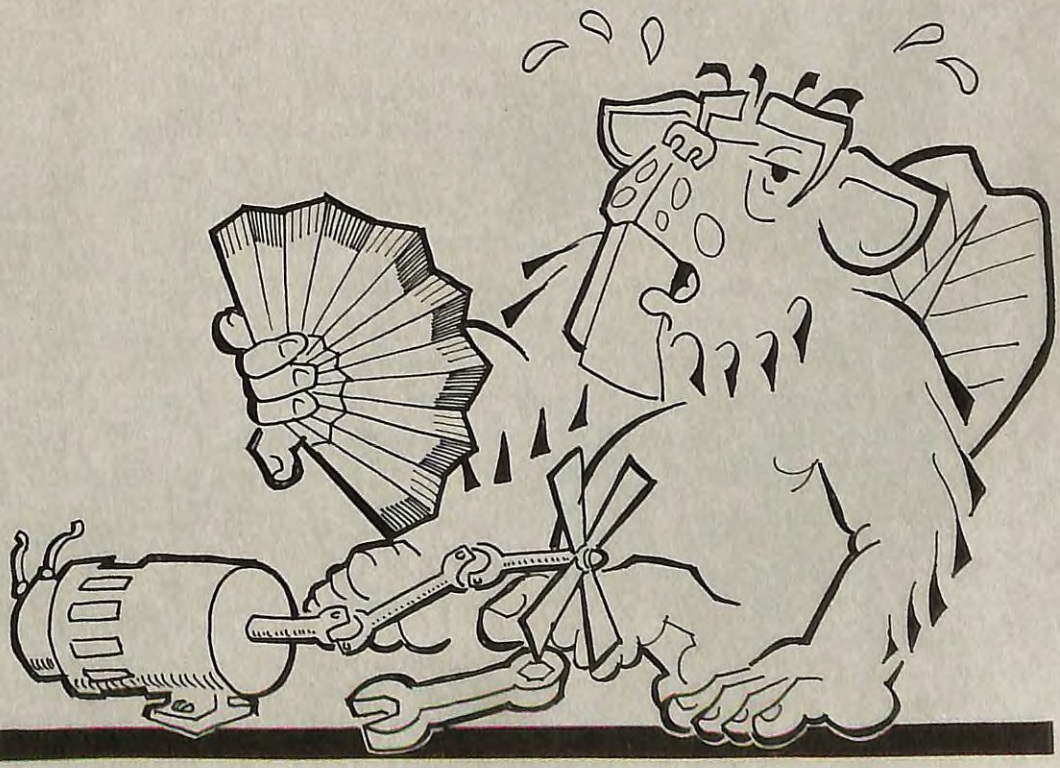
Fan Performance



From the Publisher . . . . .

Scientific research, by its very nature, tends to get involved with obscure and seemingly irrelevant details. Sometimes, research topics seem absurd. Scientific reports, full of strange alphabet soup symbols and languages are hard to comprehend. Sometimes research seems absurd, like how many angels can dance on the head of a pin. But to appreciate how things work you have to understand the basics, then the information can be used to see how it all fits together.

Canada has been a world leader in basic building research, especially for small buildings. Pioneering work done by organizations like CMHC and the NRC, without too many vested interests, has been valuable in understanding how buildings work. Key among these is the recognition that a house operates as a whole system, greater than the sum of the parts.

Understanding the concept of the house-as-a-system means that when changes to building construction or technology are considered more than just a narrow view has to be taken. We always hear about problems caused by some new technologies or products, and why don't we just keep it the way it was in the old days when we didn't have any problems. You'd think that with all the information we have, we've solved all the problems, right? In fact there are still many elements of a house we don't fully understand or appreciate. As new products come along we find out we don't know that much, especially how different systems interact with each other.

I've observed that too often, despite the best intentions, researchers don't give enough thought to the house-as-a-system. While research has to dissect a product or system to its fundamental elements, it must take into account other relevant items, or at least make a note of them.

For example, if a monitoring project finds that a group of houses have varying concentrations of indoor pollutants, it's not good enough to generalize or average the results without looking why. If one house has a family of ten and is also the neighbourhood social centre for smokers and another just has a working couple, then these elements should also be reported. Another is what kind of construction was used and what kind of finishes?

In other words, there are many other elements that may affect the performance of a house and these should be mentioned, even though they appear to be trivial and anecdotal. Unfortunately, that is not always done. Researchers too often forget that all elements of a system must be given recognition.

Richard Kadulski,
Publisher

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Energy Efficiency of Residential Fans

Greg Allen, Richard Kadulski

Fans are used to ventilate buildings to ensure comfort and health of the occupants. They move air in and out of the building, through the envelope that separates the indoor spaces from the outdoors. They also circulate air between indoor spaces.

As fresh ventilation air and air circulation are real needs, it is okay to use some energy to meet those requirements. But it should be done efficiently, ensuring that minimum needs are met, avoiding excessive flows and energy consumption. Unfortunately many existing residential systems are not only ineffective, they do not reliably meet minimum needs and they are terribly energy inefficient. To ensure good, reliable air quality and indoor climate, in much of the northern hemisphere balanced mechanical ventilation is not an option, it's a must.

Why bother with ventilation fan and furnace blower efficiency? In larger buildings air handling can account for 30% to 50% of a building's electricity use, less in houses. 20% to 25% or more of the electrical energy input to an air-handling system is lost in the fan itself.

Normally furnace blowers are set at one speed. They are either on when heat is called for, or they are allowed to run continuously during the heating season. Where the furnace fan operates only on demand during the heating season it could be running for 2400 hours over the year. There is a tendency now for furnace blowers to be run continuously for central air conditioning, air filtration, and ventilation, so power consumption is even higher.

An oversized fan usually operates at a lower efficiency than one which is properly sized; the inefficiency results in heat gain which is an additional cooling load under cooling conditions (where cooling is provided), but a useful internal heat gain when heating is called for. When gas heating is used, however, it is not an efficient or economical way to supply heat.

How inefficient are fans used now? Just how bad is it?

It seems that few devices produced by modern man are as pathetically inefficient as residential motor/fan sets.

The power in an air stream is the volume of flowing air times the pressure drop. The power needed to move air in a typical heating system that moves 450 l/s (950 cfm) @ 80 Pascals is theoretically 36 watts. So why do furnace blowers use 350 - 450 watts or more?

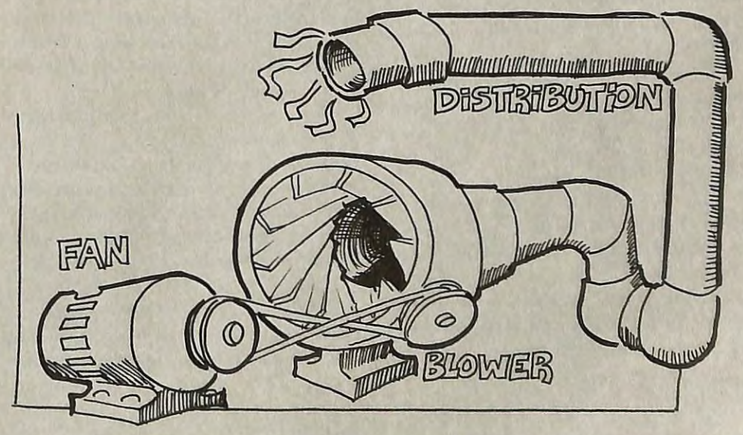
A typical ventilation rate for a house is about 50 l/s @ 80 Pa. In theory it takes 4 watts of power to move that volume of air, but most use around 100 watts or more. The real input power to a motor can be even more.

Fan Efficiency Limits

There are several elements of a fan system that affect total fan efficiency: the motor, the blower design and the distribution system. The most important element is the overall efficiency of conversion of electrical to mechanical energy. A good, efficient motor will draw the least amount of power. The most efficient are DC motors. Permanent shaded (PSC) motors are the norm in the industry, while shaded pole motors (very inefficient) are still being sold.

Some equipment is so inefficient that it actually draws more power than is measured by the meter. In the electrical industry they have a term to describe the inefficiency of electrical equipment: they call it the *Power factor*.

The power factor is used by utilities to describe and measure the efficiency of equipment at converting electricity. In commercial applications, there are even adjustments made to the rate structure to take into account the lower efficiency. Simplified, if a piece of equipment has a



power factor of 0.5 it means it is actually drawing double the power, so the utility makes adjustments accordingly.

Because they are a big element in energy use, fans used in large buildings are designed to deliver over 70% total efficiency, up to 85% for the most efficient units. In residential ventilation and heating units it's a different situation.

The efficiency in commonly used blowers and motors used in typical residential furnaces is only 20% at best. Motor efficiencies in typical bathroom fans is also about 20%, a long way from the 95% plus range that is attainable for the best available technology, and a good deal less than the reasonably achievable level of 80%.

The design of blower blades also affects the total system efficiency. It is not unusual to have measured flow rates at less than half of the fans' rated capacity and the system pressure drop more than the design value. Use of poor components and poor workmanship as well as the use of undersized, flexible ducting is a major culprit.

Both field and laboratory tests on bathroom fans and kitchen range hoods indicate that they under perform their manufacturer's data, even though total efficiencies based on manufacturer's data range from about 1% to about 6%, averaging around 3%. The typical 50 l/s (105 cfm) @ 80 Pa fan draws about 90 to 120 W, for an efficiency of 4.4%. Forced air circulation blowers are slightly better at about 10%.

In the case of furnaces, the perfect fan will move 1500 cfm at 75 Pa static pressure for 53 watts, while a common furnace fan with a 14% overall efficiency will use 380 watts.

In areas where electrical energy is expensive, an efficiency of only 3% to 15% can be a financial hardship just to run these fans.

Design and construction is usually based on what's the cheapest system to meet the code, regardless of the actual requirements. Even if that were not the only criteria, it is difficult to specify something that does not exist, and efficient motor/fan sets do not exist.

Unfortunately, fan motor manufacturers do not appear willing to manufacture a more energy efficient higher quality product. It's a catch-22 situation. Whatever the industry delivers, the market buys, so there's no incentive to tool up to make a better product until the marketplace changes. But the "marketplace" doesn't have a mechanism to demand product improvements other than through regulations which is not the same thing. Most of us are hesitant about regulations as they can easily be abused.

We can focus on the use of energy-efficient motors. But there is another issue: the oversizing of pumps and fans. This is even a bigger concern and represents more inefficiency. Oversizing generally results from the application of large safety factors during the design process.

CSA standards now specify that furnace oversizing should not be more than 40% of design requirements. Common practice in the past was to oversize by much more than 40%. In the Vancouver area oversizing furnaces by 100% and more was almost the norm. Too often furnace sizing was a matter of what was in the shop, rather than what was required.

The problem with oversizing is that the bigger the furnace, the lower the efficiency of the furnace, and the blowers attached to it.

The most effective step to take is to improve construction by building super energy efficient houses that don't need a furnace or a blower, and need minimal heating. The next improvement in energy efficiency is to increase blower efficiency and decrease airflow and static pressure to create an energy efficient forced air system. Reducing the airflow requirements (i.e. the heat load) and the static pressure are integral to this upgrade.

Fan efficiency: how big an issue is it?

Pumping and air handling account for a significant fraction of global electricity use. Improved efficiencies of these systems can be important in reducing future electricity supply needs.

If the power draw of a blower operating continuously for 6 months is reduced by 200 watts, it represents a savings over the year of 876 kWh (at $0.05/kWh this is about $43.80 in energy savings). Over a several years that adds up.

In addition, it also is a savings to the utility and the community. If we assume 10,000 houses (the number in a smaller city) have continuously operating furnace blowers a 200 watt performance improvement means an electricity savings of 8,760 MWh. This is about the same as the reduction in electrical service capacity of 2 MW, or enough power for about 200 houses.

The Bonneville Power Administration in the northwestern USA discovered during an unseasonal cold spell in 1990 that the peak electrical consumption was lower than predicted. On examination it was found that the energy conservation measures set in motion in recent years reduced the peak demand.

The moral of the story is that little savings repeated many times add up to very significant savings.

Earth Energy Systems: Ground Source Heat Pumps

Richard Kadulski

Earth energy systems are unique. Unlike systems that burn fuel to generate heat or convert electricity to heat through resistance, earth energy systems tap the heating and cooling potential of the largest solar collector: the earth itself. The energy below the earth's surface is estimated to exceed 2000 times the total current and proven reserves of all other energy sources on the planet combined.

An earth energy system will be a more expensive space heating system to install. However, it is a cheaper option when costs are accounted for over the lifetime of the equipment. It can also provide space cooling and 100% of domestic hot water at payback period as quick as 3 to 5 years.

A ground source heat pump removes heat from the earth and upgrades the heat to useful temperatures to provide space and water heating.

Traditional outdoor air source heat pumps can provide heating and cooling but when heating they are not very effective at cold outdoor temperatures and do not utilize waste heat generated indoors in summer and winter (i.e. from solar gains, exhaust air and grey water recovery and space cooling). Air-air heat pumps can supply heating loads at high efficiencies as long as the air temperature is higher than 0°C. At cold emperatures, they become straight electric reistance heaters.

Electricity for heating is generally expensive and not very efficient, especially if the electricity is generated by fossil or nuclear fuels. In some places there are few options, but if it's possible to get more heat out of a system than energy that's put in, then why not do it?

In a passive solar house, occupant activities, ventilation and solar gains provide low grade heat sources, but often such sources don't coincide with loads, so thermal storage strategies must be considered if the waste heat is to be captured and stored to supply space heat and hot water requirements. Heat storage can be integrated with the heat pump, in an integrated system, or the deep ground can be used as the heat storage.

What is a heat pump?

Heat pumps move heat from a low-temperature source to a high-temperature space not unlike a refrigerator or air conditioner. Refrigerators and air conditioners are heat pumps that remove heat from cooler interior spaces to warmer exterior spaces for cooling purposes.

Recently much work has been done on earth energy systems or (ground source heat pumps). Unlike systems that burn fuel to generate heat or that convert electricity to heat through resistance, earth energy systems tap the heat contained in the ground.

By reversing the operating cycle, it can also provide cooling.

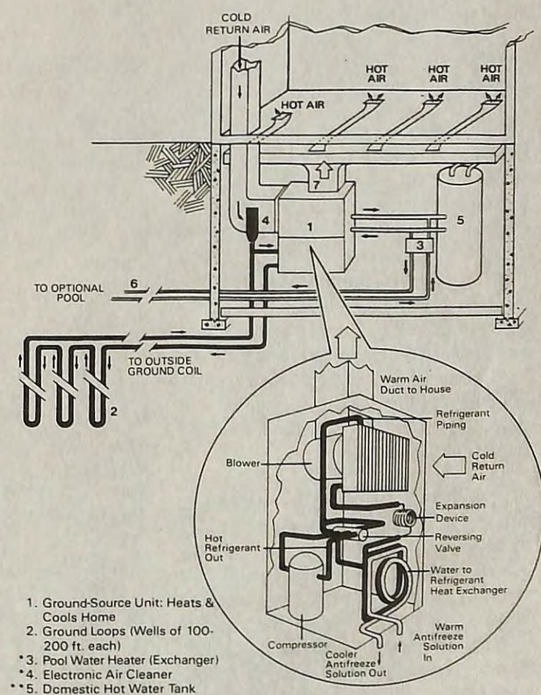
Ground source heat pumps are not a new idea. They've been used in Sweden and other European countries for many years, not only in homes but also for commercial and institutional uses. Ground-source heat pumps have been used in rural locations, but can also be installed in suburban housing developments.

The systems are reliable and they have a long service live, of 20 to 25 years.

How does a heat pump work?

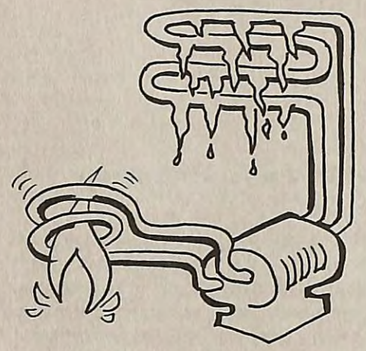
The process of elevating low temperature heat to over 100° F and transferring it indoors involves a cycle of evaporation, compression, condensation and expansion. A refrigerant, usually Freon, is used as the heat-transfer medium which circulates within the heat pump.

All earth energy systems have three parts: plastic piping buried underground outside of the house; a heat pump unit in the house; and a distribution system. In the evaporation and condensation cycle a



1. Ground-Source Unit: Heats & Cools Home
2. Ground Loops (Wells of 100-200 ft. each)
*3. Pool Water Heater (Exchanger)
*4. Electronic Air Cleaner
**5. Domestic Hot Water Tank
6. Hot Tub or Whirlpool or Outdoor Pool
7. Auxiliary Duct Heater

*Optional.
**Standard on some models.



heat pump upgrades available heat to useful temperatures. This is then delivered to the building by conventional ducted air or hydronic systems.

The cold refrigerant passes through a heat exchanger and absorbs heat from the low-temperature source. When the circulating fluid reaches the heat pump unit, another heat exchange takes place between the circulating fluid and a sealed pressurized loop that contains another refrigerant. The nature of the refrigerant causes it to boil and turn to vapour at very low temperatures. As it evaporates into a gas heat is absorbed. The gas then passes through a compressor where it is pressurized, raising its temperature. In the process, the hot gas circulates through a refrigerant-to-air heat exchanger where heat is removed and delivered to the home. As it loses heat the refrigerant changes back to a liquid. The liquid is further cooled as it passes through an expansion valve and begins the process again.

In summer the cycle is reversed to allow the heat pump to act as an air conditioner, extracting hot air from the interior for heating water and returning the extra to the ground. This 2 way cycle is important as during the heat extraction cycle the ground temperature is lowered, and could actually freeze the ground. If the system does not get a chance to re-charge, then over time the frozen ground could become permafrost, losing its effectiveness as a heat source.

In some areas, ice arenas, originally built for seasonal operation but now run year-round have created permafrost under the ice rink, causing major structural problems simply because heat is constantly taken out, and the earth below is not getting a chance to thaw out.

Earth energy systems can be installed in any soil condition, but work best in situations where there is a large difference between the air temperature and ground temperature below the frost line - which is the case in most of Canada. To maximize efficiency, a constant source of energy is necessary. Fortunately, deep ground temperatures remain relatively constant below the surface. Despite air temperature fluctuations, below grade temperatures generally range from -2°C to 16°C year round. (The lower down, the more constant they stay).

Required Site characteristics

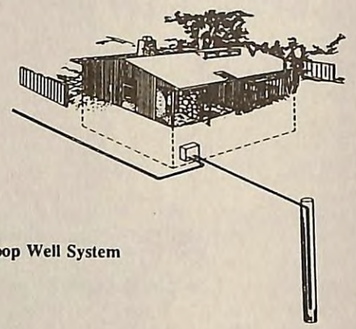
The property must be large enough to accommodate the type of ground loop chosen, and must have compatible soil conditions for drilling or trenching. The subsurface geology must be known to determine the thermal potential and to best design the ground coupling. Thus a geotechnical analysis is a must.

Types of Earth coupling

The piping circuit can be Open or Closed Loop, depending how the fluid absorbs heat from the soil. A closed loop circulates an antifreeze solution through a continuous closed piping loop buried underground outside the house.

Vertical:

A vertical Closed Loop arrangement is an appropriate choice for most suburban homes given the usual lot size. Four or five loops of piping are inserted into holes 6 inches in diameter to a depth of 60-200ft. depending on soil conditions and the size of the system. A typical installation requires about 500 sq.f.t of land.

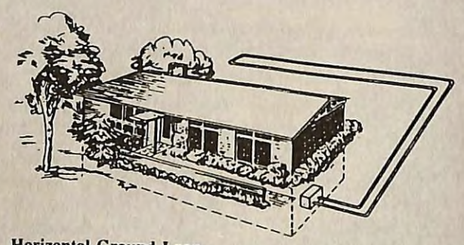


Open Loop Well System

Horizontal:

A horizontal arrangement is more commonly found in rural locations where properties are larger. The piping circuit is laid out horizontally in a trench 3-4½ feet deep so the expense of drilling is avoided. The horizontal piping arrangement can also be laid out along the bed of large pond, a river or lake. A typical installation requires about 5,000 sq.ft. of land.

Open loop (or water source) systems take advantage of the heat retained in an underground body of water. Water is drawn directly up from a well to the heat pump's



Horizontal Ground Loop

heat exchanger, where its heat is extracted, then is pumped back through a separate well. It's important to know the properties of the water as dissolved chemicals could affect the equipment if it is too acidic or alkaline.

The best choice (Open or Closed Loop) for a given house will depend on the amount of land available, the soil conditions for drilling and the presence of underground water.

Measuring Efficiency

Heat pump efficiency is measured by its coefficient of performance (COP) or its seasonal performance factor (SFP). The COP is a ratio of heat delivered per unit of energy consumed and is similar to the steady-state efficiency of oil and gas fired furnaces (a ground source heat pump must have a COP of at least 3.0 to meet CSA standard V446-M89). A typical earth energy system has a COP of 3.3 This means that for every dollar's worth of electricity used in operation, an earth energy system will deliver three dollars worth of usable heat energy to a building; energy to heat in the winter, cool in the summer and to provide domestic hot water needs year round.

By comparison, electrical resistance heating has a COP of 1, oil heating a COP of 0.65 and medium efficiency natural gas 0.8-.85.

Design Considerations

Distribution

Earth energy systems do not deliver air for heating at as high a temperature as fossil-fuelled furnaces. Typically air delivered to the registers in living spaces is at around 50°C.

Because this is cooler than the temperature of a conventional forced warm air furnace, the air must be mixed with air in the room so that the temperature is uniform and will not cause occupants any discomfort. This means that to avoid occupant complaints, the duct system design and grille placement is crucial. As a rule of thumb, distribution systems should be able to handle flow rates 20 - 30% higher than flow rates required by conventional forced-air furnaces.

For ideal air distribution, perimeter floor supply air registers are recommended. For optimal comfort, the registers should be located along outside walls, preferably under windows. This will provide good air distribution and comfort in the winter and summer by projecting conditioned air in a vertical spreading pattern toward the ceiling.

Both a low and high-wall return air inlets are recommended for each room. The low-wall return is effective during the heating season, returning the cooler air to the heat pump for warming and helping to reduce the air temperature difference between the ceiling and the floor. During the cooling season, the high-wall return is more effective at siphoning off the warm air near the ceiling, helping to keep the room cooler.

Cost?

An earth energy system is a more expensive heating system to install that conventional systems. Average installation costs are about $10,000 or more for a single family house. They are most effective where they can operate year round for heating and cooling and electricity costs are reasonable. When costs are accounted for over the lifetime of the equipment the payback period could be as low as 3 to 5 years to provide space cooling, dehumidification and 100% of domestic hot water.

The higher installation cost must be assessed in terms of the operating savings. Actual savings will vary depending on factors such as location, the cost of alternative heating fuels and electricity. The size of the system will affect the payback period; installations whit larger heating loads will have a faster payback.

Running a heat pump means that less gas or oil is used but more electricity. If the installation is in an area where electricity is expensive, the operating savings may not be as attractive. Earth energy systems are most economical when used year round to displace air conditioning costs as well as heating costs. Where there is little or no cooling load, operating savings will be lower. But as with all types of mechanical systems, decisions have to be made based on a variety of factors, not just on the initial capital cost.

Sometimes, these systems can be economical because of other considerations. In the far north, in the permafrost regions, the concern is to keep the ice frozen under the ground. Any construction usually upsets the soil temperatures so that the permafrost starts to melt, resulting in major problems for the buildings. Test installations done by the National Research Council over the past few years have put ground source heat pump loops under the building, so that the extraction of heat from the ground (and the capture of the heat being lost to the ground) provides heat and hot water to the building while keeping the permafrost frozen. The technique seems to be quite successful.

Earth coupled heat pump systems use a technology that is environmentally sound, (2/3 of the energy in an earth energy system is renewable solar energy). They displace fossil fuel systems and reduce $C0_2$ emissions.

They are also excellent for retrofit installations. Many of the same criteria apply in deciding whether the home is a suitable candidate for earth energy systems.

In general terms, such a system will be appropriate where the building envelope has been upgraded or where circumstances make that impractical. For example, EES's are especially attractive alte native for heritage brick, stone, or log houses where it is not desirable to retrofit the envelope with insulation.

More information is available in "Earth Energy Systems: A Guide to the Technology" prepared for CMHC

EMR/CANMET NEWS

The Canada Centre for Mineral and Energy Technology (CANMET) is the research and development arm of Energy, Mines and Resources. EMR/CANMET's Buildings Group works with industry to develop and commercialize the technologies to make Canadian houses more energy efficient. With the support of the Buildings Group, Solplan Review presents this information on some current CANMET projects. For more information contact: Energy Efficiency Division, EMR/CANMET, 580 Booth St., Ottawa, K1A 0E4.

ADVANCED HOUSES PROGRAM
PROGRAMME DE MAISONS PERFORMANTES

Advanced Houses Program: Stage One Finalists

Fourteen teams were selected to proceed to the second stage of the Advanced Houses Program. Winners represent all parts of Canada. They offer a fascinating glimpse into the future of housing. Each must meet demanding energy efficiency criteria (half that of current R-2000 requirements), as well as use very efficient household appliances and environment friendly materials and designs.

The **Newfoundland Advanced House** proposed by a team from the *Newfoundland and Labrador Home Builder's Association* is a 1 storey "expandable" bungalow.

The **Prince Edward Island Advanced House** is a home for the chemically sensitive, that will include a windmill powered ground source heat pump. It is sponsored by the *Construction Association of PEI*

The **Nova Scotia Advanced House**, spearheaded by *Clayton Developments Ltd.*, Halifax (the company president is CHBA Past President) is designed to be compatible with existing homes in the neighbourhood. It will feature innovative space and domestic hot water heating systems.

The **New Brunswick Advanced House** is meant to reduce the impact of the house on the site by the use of a shallow foundation and innovative exterior wall structures. It is sponsored by the *New Brunswick Homebuilder's Association*

The **maison performante de l'APCHQ** sponsored by the *Association provinciale des Constructeurs d'habitation du Quebec* is a showcase of passive solar heating techniques.

The **Ecosolaire Habitat Advanced House** (by *Ecosolaire Habitat Inc.*, Montreal) is a demonstration of the potential for energy efficient, environmentally friendly renovations of older multi-unit buildings.

The **maison Novtec** proposed for the Montreal area by *Hansed Booth Building Science & Technology,* Dalkeith, Ont. is a demonstration of construction techniques (for roof, wall and moveable interior partitions) used mainly in commercial construction applied to residential buildings.

The **Innova House** designed by The Energy Building Group, Ottawa demonstrates new environmentally friendly building components such as CFC-free foam insulation, innovative gas technology and prototype ventilation equipment.

The **Hamilton Advanced House** by the *Hamilton & District Home Builder's Association* is designed to demonstrate an automation system that integrates all electronic and electric devices in the home, as well as a granny-flat unit meant to fit into a conventional double garage.

The **Waterloo Green House** by the *Kitchener-Waterloo Home Builder's Association* will use environmentally friendly construction approaches, use components made from recycled materials and water conserving appliances.

The **Manitoba Advanced House** is designed to be a permanent demonstration and teaching facility for the building industry. It is sponsored by the *Manitoba Home Builder's Association*

The **Saskatchewan Advanced House** proposed by *Carroll Homes,* Saskatoon is an up-scale five bedroom house designed to blend into a suburban neighbourhood. It will feature a low cost air-conditioning system and prototype heat recovery ventilator.

The **Advanced Sustainable House** proposed by *Alternative & conservation,* Calgary builds on the design for the "Sustainable House" in Calgary.

The **British Columbia Advanced House** is a home designed to be market sensitive, featuring a complete home automation system, new products using recycled materials, prefabricated components and an integrated mechanical system. It is sponsored by the *Canadian Home Builder's Association of BC.*

Each team was awarded up to $10,000 towards finalizing proposals for state-of-the-art energy-efficient environmentally responsible houses. The winners of the second stage of the competition will go on to build the houses this spring. The announcement of the successful groups will be made at the CHBA National Convention in Winnipeg this February.

Future issues of Solplan Review will highlight these projects and the technologies they demonstrate.

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THE BOOKSHELF

A selection of books that will be of interest to our readers. Price and availability subject to change without notice.
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The age old craft of timber framing has gained new life in recent years. This illustrated book covers the fundamentals of the craft and the range of design and structural options available. $24.95

TIPS & TECHNIQUES FOR BUILDERS from Fine Homebuilding. A handy paperback reference on tools, layout & measuring, foundations, rough carpentry, roofs, floors, drywall, trim, built-ins and more.
$ 12.95

CHEMICAL ALLERGIES
by Dr. Richard Mackarness. Discusses the impact of chemicals used in food and household products on humans. $9.95

RADON: The Invisible Threat
by Michael Lafavore. Radon is a colorless, odorless and tasteless radioactive gas that gets into houses. RADON defines what it is, where it is, how it can contaminate a house, practical steps to overcome the problem in new construction or in existing homes.
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SOLPLAN 6: An Air Exchanger for Energy Efficient Well Sealed Houses
A do-it-yourself manual for building a heat recovery ventilator; developed by the pioneers of low energy building technology at the University of Saskatchewan. $6.95

1991 CONSUMER GUIDE TO HOME ENERGY SAVINGS
Listings of the Most Efficient Products You can Buy and much more. Contains information on how to get the most benefit from the new household equipment. Includes product listings (by make and model number) and performance ratings for household mechanical equipment and appliances. $8.35

YOUR HOME, YOUR HEALTH, AND WELL BEING
by David Rousseau, W.J. Rea, Jean Enwright. What you can do to design or renovate your house or apartment to be free of outdoor and indoor pollution. By knowing what pollutants affect our homes, and applying carefully explained step-by-step solution, dwelling can be transformed into healthy, quiet clean pleasant places. A special detailed section gives recommendations for those with environmental sensitivities.
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THE COMPACT HOUSE BOOK: 33 Prize Winning Designs - 1,000 sq.ft. or Less
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THE CANADIAN GREEN CONSUMER GUIDE Revised and expanded edition, includes the Green Directory listing more than 1200 companies providing services and or products. $14.95

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FOR THE JUNIOR SET:

RADS, ERGS AND CHEESEBURGERS: the Kid's Guide to Energy and the Environment by Bill Yanda A kid's eye-view of energy consumption and its environmental implications. An informative and entertaining book. For ages 8 and older.
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CALENDAR

Ontario Builder Forum '92
January 22-23, 1992
Sheraton East Hotel,
Scarborough, Ont.

A strong technical focus takes this successful Builder Forum into its Fifth Year. Building housing that is more compatible with the needs of the environment is a central theme of the 1992 Ontario Builder Forum

MECHANICAL COURSES Over 130 courses for mechanical trades are being offered across Canada . Courses available based upon regional needs: For course descriptions, dates, locations & fees contact: HRAI, 5468 Dundas St. W Suite 308, Etobicoke, ON M9B 6E3 Tel 416-239-8191 Fax 416-239-1983

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BACK ISSUES SPECIAL
We still have some back issues of SOLPLAN REVIEW. Individual copies of back issues are available for $4.00 each, post paid.

PACKAGE DEAL: We have a special deal on back issues if you are missing a number of them: we'll send a package containing all available issues from No. 4 to 36 (there are a number out of print), but in any case there will be at least 20 issues for only $ 40.00 (plus GST); USA and other foreign $50.00.

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Enermodal Receives Business Excellence Award

Enermodal Engineering of Waterloo, Ontario was a winner of the 1991 Canada Award for Business Excellence in the Innovation category. The Awards are presented annually by the Minister of Industry, Science and Technology to Canadian companies who exhibit excellence in their field.

The award recognizes Enermodal's development and commercial application of the FRAME computer program for calculating frame and edge-of-glass heat loss. It was developed for CANMET of Energy, Mines and Resources, as part of their on-going research program into high-performance windows.

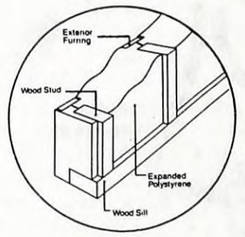
Windows have traditionally been a building's ''weak link'' in terms of insulation against heat loss. While recent years have seen a revolution in the design of more energy efficient windows, adoption of these new technologies has been slow. because lab testing is expensive, The FRAME program was developed to deal with these problems.

FRAME can be easily used by window manufacturers and gives results as accurate as those of laboratory tests. This means that the cost of rating windows by computer simulation can be as little as 10% of cost of lab testing. An indication of FRAME's success, is that the program is now used by 500 window manufacturers around the world and by Lawrence Berkeley Laboratory (the major U.S. window research agency) for all its frame analysis. It is the only acceptable program for evaluating frame and edge-of-glass heat loss for CSA and USA and NFRC standards.

Enermodal has opened an office in California in response to an increased demand for their services in the U.S. market.

(Oh, what some people will do to get to go to California in winter!)

Insul-wall
BUILDING SYSTEM



See CCMC evaluation Report Nº 09589

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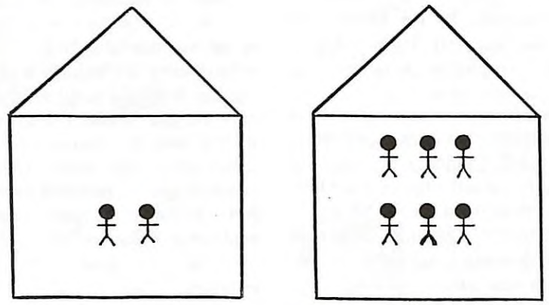

WHICH HOUSE NEEDS MORE VENTILATION?

HOT 2000

WHAT IS IT?

HOT2000 is an advanced approach to the design and modelling of energy efficient structures.

HOT2000 is an easy-to-use computer program designed to assist builders, architects and engineers design low-rise residential buildings. Utilizing current heat loss/gain and system performance models, the program aids in the simulation and design of buildings for thermal effectiveness, passive solar heating and the operation and performance of heating and cooling systems.

WHAT CAN IT DO FOR ME?

HOT2000 lets you input comprehensive data on proposed building design, analyze the expected heat loss/gain, and revise and test altered designs until a satisfactory design is achieved.

Contains extensive weather data, several models for HRV, foundation, water heating systems and more.

HOW TO GET HOT2000

HOT2000 is available from the Canadian Home Builders Association (CHBA) in either a Canadian or U.S. version at the following prices:

* $120.00 (Cdn) for the Canadian version
* $150.00 (US) for the USA version (contains US weather data)

Price includes User and Reference Manuals
Canadian residents: please add 7% GST

To order HOT2000, complete the attached form and send it with a cheque or money order to:

HOT2000 Sales
CHBA, Suite 702,
200 Elgin St.
Ottawa, Ont. K2P 1L5
Tel: (613) 230-3060

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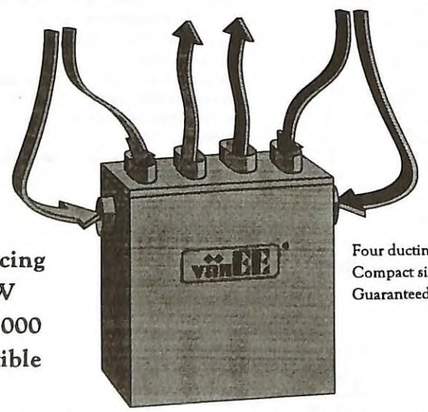

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Green Plan Initiatives for Homes and Buildings

Jake Epp, Minister of Energy Mines & Resources announced a series of initiatives to encourage a more energy efficient building industry in Canada. Better energy use in buildings is important to making them more environmentally sensitive. The actions, part of EMR's Green Plan activities, include:

- Development of a Building Energy Code. The model code will be an update of the "Measures for Energy Conservation in New Buildings", and will be developed through a consensus process like all other codes and standards.
- Building Information Transfer activities to ensure that all building professionals and consumers have an easy and effective access to the best building technologies.
- The R-2000 program, launched ten years ago in co-operation with CHBA, has been an important element in changing housing technology in Canada. Licensing agreements with local Associations and key energy players in the regions will ensure that the work pioneered by the R-2000 program continues and is kept up to date.
- Buildings Research and Development Technology Transfer. The search for promising and innovative energy efficient products and technologies will be continued. Some of the work is done directly by CANMET, but most is contracted out to industry and agencies involved.
- Federal Buildings Initiative is seen as a means of "practising what we preach". Energy efficiency in federal government buildings will be identified and modifications implemented through the energy savings generated.

C-2000 Program

Taking a page from the R-2000 program, CANMET is launching the C-2000, program to encourage the construction of high performance commercial buildings.

"Actually, the R-2000 program is less a role model than it is an analogy" says Nils Larsson, program coordinator for C-2000. "While there are similarities between the two programs, such as the energy performance standards and an emphasis on increasing the marketability of the building, the differences are pronounced."

Perhaps the greatest difference is that under C-2000 program high performance includes more than energy efficiency. It also takes into account outdoor environmental impact, indoor environmental performance, as well as the functional performance of the structure. It is expected that this concept of total building performance will ensure occupant productivity at an acceptable cost and ease acceptance by the industry.

In another departure from the R-2000 program, C-2000 places an emphasis on maintaining initial performance levels over the life of the building. Buildings constructed under the program will be eligible for certification renewals at regular intervals. C-2000 plans to establish a monitoring program so that annual assessments can be made of the initial and long term performance of buildings in the program.

As a consequence, the program will require the development of management plans, training of building operators, and the long term participation of tenants. It will also mean an emphasis on quality assurance at the construction stage.

At present C-2000 is meant to be a pilot program only, limited in scope and duration, with probably less than a dozen buildings - including office buildings, multi-unit residential buildings and multi-use buildings to be selected over a two-year period. For maximum impact, the program will be open to participants from across the county and will include both new and retrofit structures.

One problem, according to Larsson, is that there is no central industry organization that can pick-up the ball once CANMET gets it rolling. "R-2000 had the CHBA but the commercial building industry is made up of a vast number of professions, each with their own association." As a result, early emphases is being placed on developing links with industry organizations to see if one, or a consortium of organizations is interested in carrying the work on once the pilot program is finished. "Ideally," says Larsson, "someone steps in and this becomes an ongoing program. At a minimum, we get trickle down effect where new design approaches, procedures and technologies are adopted by the industry."

Larsson expects that calls for proposals will be issued as early as the summer of 1992. In the interim, CANMET staff will continue to develop the technical criteria for energy, environment and economical performance in consultation with the industry.

For more information on the C-2000 program, or the C-2000 workshops, contact Nils Larsson at CANMET.

People on the move:

Robin Sinha, has moved to CANMET, to take charge of the monitoring for the Advanced Houses Program. For the past 4 years he was with CMHC.

Ian Morrison, a buildings group researcher at NRC is now with CANMMET working on the C-2000 program.

Karen Greig will coordinate the 1st International Advanced Housing Technology Conference, scheduled for the spring 1993, in Vancouver.

Terry Robinson, Senior Researcher at CMHC is moving to the private sector, joining Scanada Consultants Ltd.

Technical Research Committee News

Canadian Home Builders' Association

Ventilation Position Paper

A draft copy of the position paper has been prepared, and comments are invited. Once it has been adopted, it will spell out CHBA's position on the issue, and will be referred to when there are discussions on standards and codes.

The paper spells out the background and offers one of the clearest, most concise statements why mechanical ventilation must be considered in construction. It identifies reasons why ventilation may be needed in houses. These include: need to remove pollutants and smells; moisture control; combustion air for fuel burning appliances; make-up air for natural draft flues; and make-up air for appliances.

It discusses the airtightness levels of current houses and the fact that most houses built today require some form of mechanical ventilation. What levels of ventilation are required and what kind of regulations are needed are also discussed.

Key areas that need to be refined are indentified, including getting more information on pollutant production from building materials, the need for being able to determine the performance of ventilation system components, and some questions about current standards levels that should be reconsidered.

Copies can be obtained thorough your local association or the TRC directly.

Prescriptive Ventilation Standards

Work is continuing towards the development of prescriptive designs that meet code ventilation requirements. This should simplify the task for most builders and inspectors, yet alternatives would still be permitted if they met accepted standards (such as CSA F326).

Saskatchewan flooring survey

In response to many complaints and enquiries about flooring problems received by the TRC, especially on the prairies, a research study was undertaken to get more information about the extent and nature of the problems. The survey received a high number of responses from builders in all parts of Canada. The kinds of problems that were identified include problems with sheet flooring materials, squeaking floors, problems due to shrinkage of floor joists, and excessive deflection of joists when heavy loads are put on the floor.

The survey was able to define the problems and to propose a research program to deal with all the issues raised. A research plan was developed to look at floor joists, subfloors, underlays, and finish flooring.

Some interesting highlights of the survey include: a majority of builders think that kiln dried joists should have less than the allowable 19% moisture content (and many would be willing to pay extra for drier joists); many think that present grading rules for dimension lumber are not adequate for quality control; many reported that installers using particle boards had problems with eye and nasal passage irritation; many commented on the poor quality of some vinyl flooring products.

The study will have a great impact in directing future research work by housing agencies. It will be followed by a program of technology transfer - in other words getting the message out to the people in the field.

A need for a flooring systems installation manual was also identified.

Crawlspace Ventilation: Suggested Code Changes

A CMHC sponsored study on problems with crawlspace construction in B.C. (*SOLPLAN REVIEW No. 40*) identified a number of areas where improvements to conventional construction practices could eliminate most problems. Some of these should lead to Building Code revisions so that common errors are avoided. The TRC is reviewing suggested code changes for the next edition of the code. Suggestions or comments from builders who have experience with crawlspaces are encouraged. The TRC can provide you with the language that is being proposed

The Technical Research Committee (TRC) is the industry's forum for the exchange of information on research and development in the housing sector. Membership includes builder members and representatives from industry, standards and governments bodies with an interest in housing. Anyone with a problem, technical question of suggestions for areas that need to be investigated is encouraged to contact their local Home Builder's Association technical committee or the TRC directly.
To contact the TRC:
Canadian Home Builders Association, 200 Elgin St. Suite 502, Ottawa, Ont. K2P 1L5
Tel: (613) 230-3060

You asked us

What is the definition of a house wrap (i.e. Tyvek or Typar)? Is it a moisture, weather or air barrier?

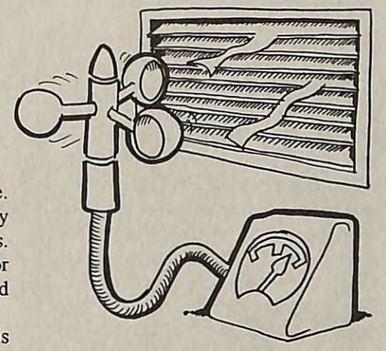
The answer is a bit of all of the above. A house wrap is a new term developed by the manufacturers of these new products. They are new high-tech replacements for the old style building paper that was used under siding.

The main reason a building paper is used is as a back-up to the siding is to stop any weather driven moisture from penetrating the structure and insulation; it stops bulk water penetration.

House wraps also act as a wind barrier, reducing air penetration into the structure, reducing wind induced pressure differences across the building envelope. We want to reduce air movement across the building envelope as air movement is the major source of moisture movement into the construction. Once warm interior air finds its way into the building envelope, it is cooled off and is going to give up the moisture that warm air contains, so that water condenses when it encounters a cold surface.

Wet building materials create ideal conditions for deterioration, shortening the life span of the construction. Frost action when the water freezes makes things worse. The house wraps offer an easy way to make the building envelope airtight as they come in wide sheets that cover a large portion of the house in one sweep. To seal the wrap, joints can be sealed using special tapes.

The new house wraps, while they stop water penetration, are porous to water vapour, thus allowing water vapour to pass, so that any moisture that does make it through the construction is not trapped (as is the case with most tar-impregnated building papers).



Is it feasible to measure HRV air flows at the grilles?

Why would you want to?

The question is not as strange as it may seem. Current understanding of how a house operates has lead to a greater emphasis on distributing ventilation air flow. A balanced, distributed ventilation air is the preferred way to do it. Standards and good design says that you want so many cfm or air in each room, but it's much trickier to achieve than it may seem at first glance.

To measure air flows at any grille requires placing a manometer probe tube into the throat of the grill, above the restrictor plug, and measuring the duct pressure.

There are also grilles on the market that are specially manufactured and calibrated, so that a table for the grille is used establish what the air flow through it should be.

If you have a problem or question about some aspect of construction technology you are welcome to send it to the TRC or directly to Solplan Review. A couple of questions we've received recently are being dealt with this issue.

New Dryer Vent Cap

A new Dryer Vent Closure, designed to be installed on the outside to replace the conventional flapper style dryer vent is now available in Canada. It has a floating shuttle cup which rises and lowers with the pressure of air from the clothes dryer, positively closing every time, unlike conventional vents. It reduces air leakage, dust or insects from entering the home through a typically loose fitting damper. Made from an ABS plastic it can be painted to match the exterior of the house. List price is $24.95.

A version is also available with a counter balance for low velocity fans such as kitchen and bathroom exhaust. It has a spring mount which causes it to rise and lower.

For information
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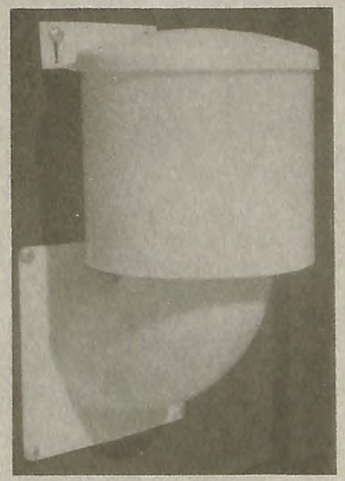


POWER SMART

Update

How do you implement changes? You can regulate, as in being done in new energy efficiency regulations in Ontario and B.C.. You can do it by the carrot and stick method of persuasion. We've reported about B.C. Hydro's Power Smart Program to promote energy conservation.

Has it been successful?

Being a strong supporter of energy conservation measures, I may have a biased viewpoint. But anyway you look at it, there seems to be a market penetration. You can't go into hardware stores, lumber yards, and appliance stores in B.C. without being aware of promotions for *Power Smart* products. What about results? The numbers are starting to come in. Public response has been very good and has even pushed suppliers to respond.

One program has promoted energy efficient refrigerators. The results? Energy-efficient refrigerators now have an 80% market share in B.C. up from 15% at the start of the Refrigerator Efficiency program.

In order to ensure that old fridges don't stay in use as a second fridge (or inefficient beer coolers) B.C. Hydro started a Refrigerator Buy-Back program. A pilot project in 7 municipalities has collected almost 10,000 under-utilized fridges in a year. The service is to be extended to other areas of the province this year. The refrigerators are taken to a dismantling facility where the CFC's are extracted in an environmentally safe way and the steel sent for metal recycling. The goal is to pick up and dismantle about 40,000 refrigerators per year.

Who says only Yankee carpet baggers are the only master salesmen? The *Power Smart* marketing concept has spread quickly outside of B.C.. 13 Canadian utilities have now become subscribers to Power Smart, thus picking up on B.C. Hydro's expertise in marketing new approaches to selling energy conservation.

It's now spread internationally. International membership grew with the addition of five energy agencies representing Czechoslovakia, and enquiries and negotiations are combining with countries as far afield as Thailand, Mexico and Poland.

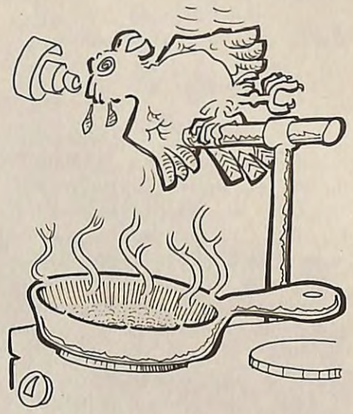
Cheaper Money for Energy Efficiency

The **Quality Plus Program**, the R-2000 Program in B.C. has just made some changes in administrative structures. Key among them is the signing of new industry partners. The most significant new one is the **Bank of Montreal.**

The Bank is now offering a 1/4% discount off their best mortgage interest rate for home buyers who buy a registered Quality Plus/R-2000 home from a builder.

In addition, they are offering a banking package to builders who deal with the bank.

The rate discount may not seem like much, but it is a significant move for a major financial institution to take. It also sends signals to home buyers that should encourage them to consider energy efficient homes, even in area with exceedingly low energy costs.



Canaries as signals ?

In the last century miners used to take canaries with them down with them into the mines to act as gas detectors: if the birds died it indicated there were dangerous concentrations of gas in the mine and the miners should get out.

So what does this have to do with today's housing? A radio interview with a local veterinarian reminded me of this as he was discussing problems that pets may have during the Christmas holiday season. He indicated that birds should not be brought into the kitchen when non-stick teflon coated frying pans are used as these pans give-off some low level concentrations of gases that are toxic to small birds.

The question is: if they're that toxic for birds, how about us humans? It doesn't seem too terribly healthy.

(Yes, I have and use a non-stick frying pan, but I admit to having some reservations about it now).

Air leakage

Single family builders are familiar with the need for air sealing homes to produce a comfortable and durable home. It is of interest to note that maintaining the air barrier is a bigger concern for builders of larger multi storey buildings. Moisture, driven into the building structure by stack effect pressures, is the major source of failure in buildings even reinforced concrete structures with metal stud frame partitions and cladding.

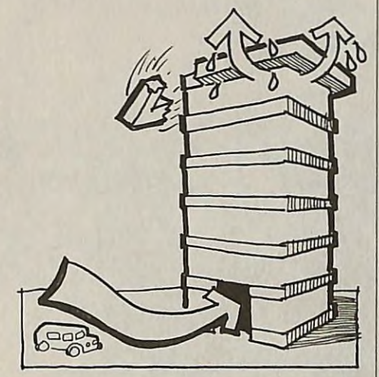
The icicles that look so pretty in the winter are a classic indication of moisture (and heat loss) due to stack effect. While the icicles may be dangerous, even more dangerous are the bricks and stucco bits that fall off buildings, loosened by action of moisture.

The reverse can also be a problem with wind driven moisture being forced into the structure.

To avoid these problems, buildings must be built tighter. The air tightness of buildings has been increasing over the past decade, but little testing or enforcement is applied to Part 3 buildings (greater than 6000 sq. ft.).

To determine the extent of air tightness and air movement in B.C. high rise buildings, CMHC commissioned a study. Three sample high rise buildings in Victoria were selected for testing. Moisture problems associated with rain penetration were encountered in all 3 occupied buildings.

It was found that air leakage in apartment buildings can vary considerably from building to building, and from floor to



floor within a particular building. The average Normalized Leakage Area (NLA) for the buildings tested is 1.25 cm^2 per m^2 of envelope area, or about 1.8 times more than the maximum allowable NLA for R-2000 houses.

Numerous minor Indoor Air Quality problems were noted.

In many high-rise apartment building air leakage through exterior walls, between units, and to and from service chases provides most of the ventilation air to the suites. As with houses, uncontrolled leakage can result in problems with air quality, moisture, energy costs, and ventilation. Life safety may be a concern if fire barriers are not sealed adequately against smoke passage.

In one building poor garage ventilation created relatively high concentrations of carbon monoxide within the building; spot tests showed CO levels above acceptable levels in the lobby and on the top floor.

Electronic building code

The 1990 National Building Code of Canada and the 1990 National Fire Code are now available on floppy disks (in both English and French). The 1990 Ontario Building Code is also available on floppy, but in English only. These contain the full text of the Codes, the Tables, and those illustrations that were prepared in electronic form.

Requires an IBM-Compatible PC, 286, 386, or 486 with a hard disk with sufficient space for 2 Mbytes. DOS version 3.0 or higher should be used.

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Builders' Videos from Minnesota

The theory and techniques for building homes that are healthy, energy-efficient, comfortable and durable are presented in a new video series produced by the Cold Climate Housing Centre at the University of Minnesota. The 12-part series *"Building for Performance"* covers building science principles, design considerations, recommended construction features and presents step-by-step instructions for various techniques of airtight construction and managed ventilation systems.

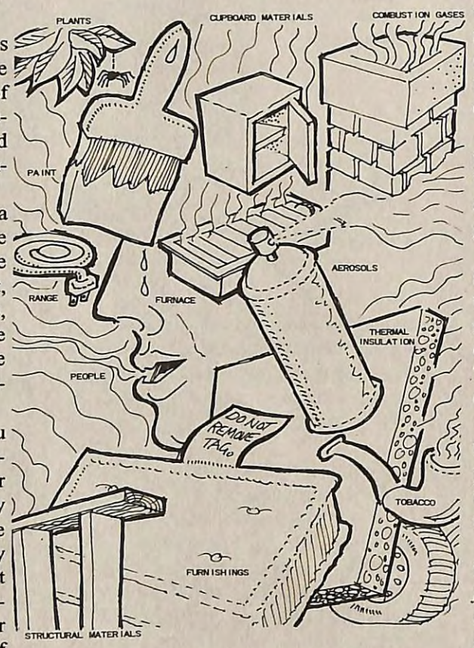
The programs vary from 3 to 27 minutes and include more than 150 on-site construction shots and 75 graphics. Eleven programs are targeted toward contractors, project managers, supervisors, subcontractors and crews. One program is specifically directed to consumers shopping for a new house and could be used as a marketing tool for builders who use the recommended construction techniques.

The overriding message of this series is that a house is a dynamic system and must be built to accommodate interactions between the structure, mechanical systems and occupants. If the systems approach to building is ignored, a new house could develop performance problems from moisture of poor indoor quality.

The *"Building for Performance"* tapes can be purchased individually or in special sets of programs assembled specifically for consumers, educators or builders. *For prices and details, contact: the University of Minnesota, MES Distribution Centre, Room 3 Coffey Hall, 1420 Eckles Ave., St. Paul, MN 55108. Tel: (612) 624-4952*

programs include:
- *Shopping for a Performance-Built House: "Test Drive" Before You Buy*
- *Cure for the Common Callback*
- *The Ins and Outs of Building Science*
- *Performance Indicators for New Houses*
- *Envelope Series*
- *A Guide to Envelope Design How to Seal Air Barrier Penetrations in Walls and Ceilings*
- *How to Install an Air Barrier and Insulation at the Rim Joist*

Building with Clean materials and products: Where do we stand?



Many indoor air quality problems can be prevented during design. While the importance of correct design of ventilation systems has long been recognized, selection of materials and products must now receive more attention.

The issue has been identified as a major problem in many large office and commercial buildings. But the same issues are a concern in homes. In fact, it may be more of a concern in homes, as we spend more time there. We are also discovering that more of us are vulnerable to problems due to pollutants in the environment.

Just think about the last time you went home with a headache after breathing the fumes from some solvent or adhesive. That stinky stuff isn't very healthy, but too often we don't have many alternatives. Those fumes may be strong when you apply them, but they also linger at lower concentrations, sometimes for long periods after the occupants have moved in. None of this contributes to healthy indoor air.

But how can one make sure they build-in good indoor air quality? One way is to use materials and products with low emissions of substances that can cause health or comfort problems. Over the past several years, research and development of product testing procedures and exposure prediction models have produced useful tools for evaluating the suitability of building materials, furnishings, and other products used in buildings. It is important to avoid sources with emissions that are too great to be diluted and exhausted by ventilation, or removed by air cleaning devices.

The best approach for evaluating indoor materials and products is to test their emission rates and predict pollutant concentration in the building where they are to be used. Emission testing and prediction of occupant exposures has recently become a key step in the design of some major office building projects.

To help avoid such problems in its new and renovated buildings, the US-EPA has begun to emission-test several products and is considering requiring an emissions rate testing report for the five major organic compounds emitted and for any specified compounds at three "ages" of the product. Manufacturers or suppliers will be required to provide a Material Safety Data Sheet for the chemicals used in the manufacture of each product.

Emissions rate data will be required from manufacturers or suppliers of coatings (paints, varnishes, waxes); flooring or wall covering materials made of plastics, fibbers, or fabrics; adhesives (e.g. for floor or wall coverings), furniture or furnishing with substantial amounts of pressed wood or fabrics; non-metallic materials used in the ductwork of the ventilation system; office machines; supplies (e.g. coated papers); and maintenance materials (e.g floor waxes, restroom odorizers).

As part of its "Healthy Building" program for its new office buildings, Washington state requires various design and operational features to achieve good indoor air quality.

One of the design considerations is selection of materials and furnishings that meet emissions criteria. Requirements include large-chamber testing of emissions from workstation set-ups. Testing covers a 6 week period to obtain data on emission rate changes.

Several large building projects in the U.S. are using the following approach to specifying materials and products in their building design requirements.

Contract General Conditions call for: *Materials shall be designed, manufactured, handled, installed and maintained in a manner that will produce the least harmful effects on occupants of the building.....suppliers shall submit a list of all chemicals used in the manufacture of the product (including a breakdown of the contents by weight or volume); a description of any procedures used by the manufacturer to minimize the emissions of VOCs from it product(s); a description of all emission testing performed; and a listing of all chemicals in the product that considered carcinogens by the U.S. EPA or the State of California.*

Specific materials for which the general conditions are amplified include carpets and carpet adhesives; vinyl flooring; caulks, sealants, glazing compounds, joint fillers; paints; insulation; workstation panels.

Whether the emissions from any source will lead to "acceptable" indoor concentrations and occupant exposures will depend on a number of factors, including:

- emission rates;
- the toxicity or irritation potential of substances emitted;
- physical relationships between the source, the persons present, and the space they occupy; and
- the sensitivity of the occupants.

The complexity of these factors makes acceptability an essentially situation-specific issue.

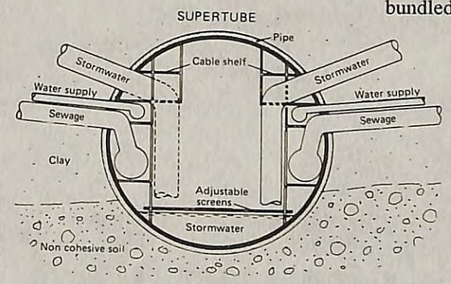
Emission rate testing and exposure modelling of certain materials and products has become a significant step in the design stage. Such efforts, with appropriate attention to ventilation system design and operation, aesthetic and ergonomic factors, and building maintenance, are almost certain to reduce the occupant complaints that characterize "sick buildings". But the ability to design buildings with materials that maintain good indoor air quality is hampered by the lack of data on emissions and clear, predictable cause-effect relationships between exposure to pollutants and health or comfort effects.

Just think how long it took to establish the cause-effect of tobacco smoke - and you can see and smell that stuff. With some of the chemical pollutants, the concentrations are smaller and not as obvious.

Emission factors are not yet widely available from manufacturers, suppliers, or building designer. As owners and designers of large building projects require testing, a data base will be developed. In time owners or designers of small building projects will have access to this data also, or at least to products that have met the requirements of large projects.

Extracted from Material from a technical paper by W. Gene Tucker, (Air and Energy Engineering Research Laboratory, U.S. Environmental Protection Agency, Research Triangle Park, NC) presented at the Indoor Air Quality '90 conference held in Toronto., in 1990.

The Supertube: Alternate Site Servicing



I've often wondered why services aren't bundled together, which is why I was interested in seeing a report on Swedish building research which describes the Supertube project.

The Supertube is a large diameter culvert enclosing water supply and sewage pipes as well as cables. It represents a pioneering technology which provides an alternative to conventional culvert laying methods - with an accessible multi-service culvert.

It is intended to help make development on sites with poor ground conditions possible at a reasonable cost.

The Supertube consists of plastic and concrete pipes approximately two meters in diameter. Water supply pipes and sewage pipes are drawn from the tube into buildings. It also can accommodate electricity and telecommunications lines which are easily accessible for inspection and repairs. Storm water is drained off at the bottom of the tube.

The Swedish Council for Building Research is providing financial support for a trial of the Supertube concept in Stockholm. It is meant to illustrate how combining the accessible multi-service culverts in an area with poor soil conditions can offer cost reductions in new building developments.

Subdivision servicing is a messy job, with at least 2 and as many as 7 services provided underground. Too often each is supplied separately, in its own trench and at different times. There are lots of chances for one hook-up to damage previously installed services. Often, the street will be repaved and finished before all services are hooked up, so that more patching and fixing has to be done each time a service is brought in.

Sound familiar?

In the far north, where permafrost conditions call for it, services are bundled into above ground service structures (known as *utilidors*). In the south, were we can dig, it seems that every utility jealously guards their own pipes and wires. Combining utilities into common trenches are not allowed.

Sir,

In reference to Sebastian Moffat's suggestions about crawlspaces, (SOLPLAN REVIEW No 40):

All the practices advocated are already in the Building Code if one looks at the intent and not the disjointed manner in which it is presented (e.g. sections 9.14, 9.16, and 9.18). It also allows key decisions to be made arbitrarily on site, when phrases such as "unless ground water levels" or "where it can be shown to be unnecessary" are used. It's not always clear where the water table is especially if construction takes place in the dry season.

To me it seems to be a problem of tying the intent and practice together into code language, rather than relying on practice and individual experience.

I would like to see drains dealt with clearly (with or without traps) from the lowest point in the crawlspace to the outside. Perhaps a simple drain to the drainage layer under the crawl space skim coat may be enough.

Hot water tank reliefs may be drained to the outside, but water shut-off valves are often in the crawl space, hard to access. It's hard to tell how important this may be, or what the life span of plumbing is, but it should be dealt with.

Builders who build better than code minimum and install a good vapour barrier with a well finished skim coat may be inadvertently building swimming pools in the event of plumbing failures.

David Riley,
Circa Homes Ltd., White Rock, B.C.

Energy Efficient Home Award

The Solar Energy Society of Canada Ic. (SESCI) is looking for environmentally sensible super energy efficient houses for the first annual Autonomous House Award.

Why a competition? We are facing major environmental problems caused in large part by over-use of inappropriate sources of energy. Now is the time to recognise and adopt some appropriate solutions.

Scattered across Canada are many well-insulated, super energy efficient homes that are taking advantage of solar energy and incorporate other environmentally sensible measures such as water conservation and low impact materials but we never hear about these houses because they are usually built on a low budget without the glamorous features that attract media attention.

The Solar Energy Society of Canada will showcase outstanding demonstration of an autonomous house each year to demonstrate the technologies that are working for families concerned about the future of the planet. Winners of the First Autonomous House Award will be announced in July 1992, at the Society's Annual Conference in Edmonton, Alberta.

What houses are eligible? Any house in Canada, new or old, single family, semi-detached, or row housing, with a proven performance of very low, purchased energy consumption, together with other environmentally-sensible features. Judging criteria will not be limited to energy performance. Performance of the house will be verified by a third party.

Who can enter? Anyone who owns, lives in, has designed or built an eligible house.

How to enter. To obtain an entry form including more details on submission requirements, judging criteria, etc. send $3.00 for postage and handling to: SESCI, Suite 421, 301 Moodie Dr., Ottawa, Ont. K2H 9C4

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